**Before the**
**Federal Communications Commission**
**Washington, D.C. 20554**

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| In the Matter of | ) | |
| | ) | |
| Restoring Internet Freedom | ) | WC Docket No. 17-108 |

**Comments of Hal J. Singer, Ph.D.**

## INTRODUCTION AND SUMMARY OF OPINIONS

1. I am submitting comments in the Restoring Internet Freedom proceeding with respect to one specific question raised in the Notice of Proposed Rulemaking (NPRM):

> (1) Paragraph 46: "We seek comment on how the burdens associated with Title II regulation have impacted broadband investment and, as a result, consumers. Has the Commission's increased regulation of broadband adversely impacted broadband investment and innovation?"

My comments borrow heavily from my prior writings on the subject of net neutrality.[1] I might address other questions raised in the NPRM at a later date.

2. Regarding investment effects, I conclude that U.S. investment in broadband infrastructure by Internet service providers (ISPs) declined materially after the imposition of common-carrier rules in early 2015. While it is not clear whether the reclassification of ISPs under Title II was the cause of that decline, it is possible to isolate the impact of common-carrier rules using a natural experiment from the late 1990s/early aughts, in which cable operators were not

1. *See, e.g.*, Hal Singer, Three Ways The FCC's Open Internet Order Will Harm Innovation, PPI Paper, May 19, 2015, *available at* http://www.progressivepolicy.org/issues/economy/three-ways-the-fccs-open-internet-order-will-harm-innovation/.

subject to common-carrier-style unbundling rules, while incumbent telephone providers were. A simple difference-in-differences model applied to that natural experiment reveals that common-carrier rules slowed incumbent-telephone capital accumulation by roughly five percent.

## QUALIFICATIONS

3. I am a Principal at Economists Incorporated, a Senior Fellow at George Washington University's Institute for Public Policy, and I have served an Adjunct Professor at Georgetown University's McDonough School of Business (where I have taught Advanced Pricing to MBA candidates).

4. Prior to joining Economists Incorporated, I was a Managing Partner at Navigant Economics, and before that, I was Chief Executive Officer of Empiris, a litigation and regulatory consulting firm (acquired by Navigant in 2010).

5. I am the co-author of the e-book *The Need for Speed* (Brookings Press 2013), and the book *Broadband in Europe* (Springer Press 2005). My articles have appeared in dozens of legal and economic journals, as well as economic textbooks.

6. I have testified before Congress on the interplay between antitrust and sector-specific regulation. My scholarship and testimony have been widely cited by courts and regulatory agencies. In agency reports and orders, my writings have been cited by the Federal Communications Commission, the Federal Trade Commission, and the Department of Justice. I served as an economic consultant to the Canadian Competition Bureau in a review of vertical merger in the television industry. My economic practice has been recognized by the American Antitrust Institute, and I have been a frequent speaker and author for ABA Antitrust Section events and publications, respectively.

7. Although my experience spans several industries, I have considerable experience in media and telecommunications. I served as a testifying expert in four program-carriage cases (adjudicated by an Administrative Law Judge pursuant to section 616 of the Cable Act) on behalf of independent cable sports networks: MASN, NFL Network, Tennis Channel, and GSN. I have also served as an expert for Internet service providers (or their trade association) in several matters before the FCC, including most recently on behalf of Verizon in a roaming dispute, and on behalf of USTelecom in the business broadband proceeding.

8. I earned M.A. and Ph.D. degrees in economics from the Johns Hopkins University and a B.S. *magna cum laude* in economics from Tulane University.

## I. COMMON-CARRIER RULES TEND TO DEPRESS CORE INVESTMENT

9. Relative to 2014, the last year before ISPs were reclassified as telecommunications providers and subjected to common-carrier rules, broadband investment in the United States has declined. Whether that decline was caused by the rules is an open question. A natural experiment from the late 1990s/early aughts implies a causal connection.

### A. The 2015 Reclassification Is Correlated with an Investment Decline

10. What happened to broadband investment under Title II? According to the latest data from USTelecom,[2] the broadband industry trade association, broadband investment declined for the first time in 2015 since the economy emerged from the Great Recession. Even though the FCC's reclassification order was not adopted until late February 2015, the industry understood that Title II would be the law as early as November 2014. Not only was investment less in 2015 than in the prior year (a useful benchmark for a world absent Title II), but aggregate investment

2 Patrick Brogan, Broadband Investment Heads in the Wrong Direction, available at https://www.ustelecom.org/blog/broadband-investment-heads-wrong-direction.

took *another drop* in 2016 (a decline of roughly $3 billion or four percent compared to 2014 levels).

11. USTelecom's historical collection of U.S. broadband data is considered by many to be the industry gold standard. It has been cited repeatedly by the FCC in its annual Broadband Progress Report.[3] Indeed, Tom Wheeler, who headed the FCC during the Obama Administration, credited USTelecom's data in his final speech[4] at the Aspen Institute as FCC Chairman. (He claimed that broadband investment increased from 2013 to 2015 per USTelecom; while technically true, the statement is misleading, as it presumes that 2013 is a better benchmark for broadband investment absent Title II than is 2014.) USTelecom's survey draws from the ISPs' financial filings before the Securities and Exchange Commission. And the same analyst at USTelecom has been employing the same standards for how and when to treat spending as broadband investment since the survey's inception nearly a decade ago.

12. Other analysts, including PPI[5] and myself,[6] independently detected a drop in ISP capex in 2015 and 2016, respectively. And CTIA, the industry trade association for wireless ISPs, reported an investment decline of 17.4 percent among its members in 2016,[7] following on the heels of impressive capital growth of 18.9 and 10.1 percent in 2012 and 2013, respectively.

13. Proponents of common carriage have introduced alternative data to suggest incorrectly that capital expenditures have increased since the imposition of Title II. Senator

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3. 2015 Broadband Progress Report and Notice of Inquiry, Feb. 4, 2015, *available at* https://apps.fcc.gov/edocs_public/attachmatch/FCC-15-10A1.pdf.

4. Klint Finley, *Outgoing FCC Chairman Tom Wheeler: Net Neutrality's Not Dead*, WIRED, Jan. 1, 2017, available at https://www.wired.com/2017/01/outgoing-fcc-chairman-tom-wheeler-net-neutralitys-not-dead/.

5. PPI, Investment Heroes 2016: Fighting Short-termism, *available at* http://www.progressivepolicy.org/wp-content/uploads/2016/10/InvestHeroes_2016.pdf.

6. Hal Singer, 2016 Broadband Capex Survey: Tracking Investment in the Title II Era, *available at* https://haljsinger.wordpress.com/2017/03/01/2016-broadband-capex-survey-tracking-investment-in-the-title-ii-era/.

7. CTIA, Annual Year End 2016 Top Line Survey Results, available at https://www.ctia.org/docs/default-source/default-document-library/annual-year-end-2016-top-line-survey-results-final.pdf?sfvrsn=2.

Markey, points to the ACES survey by Census, which shows an increase in 2015 investment levels for telecommunications providers. But this survey contains significant investment outside of the "core" of the Internet, including satellite television and radio investment, as well as spending on leased handsets. Free Press offers alternative data that incorrectly includes Sprint's leased handsets (not "capitalized" until the fourth quarter of 2014) and AT&T's investments via DIRECTV and a Mexican affiliate. Recall that the hypothesis of interest is whether Title II discouraged investment in the *core of the network*; a diversion of investment to non-core areas (or core areas outside of the United States) is not proof that Title II "is working," as Free Press claims.

14. While not proof of causation by itself—we have detected a correlation between the imposition of Title II and core investment—this sudden and unusual drop in broadband investment demonstrated in USTelecom's survey should raise questions. If not Title II, what else could have changed in 2015 that caused broadband investment to decline? There are alternative hypotheses, such as the possibility that next-generation broadband networks do not require the same level of capital expenditure relative to operating expenditure, but no one to my knowledge has demonstrated the significance of 2015 to that story.

**B. Exploiting a Natural Experiment to Isolate the Impact of Common Carrier Rules**

15. Like any decision in economics, network investments by ISPs are made at the margin. Each project has a different expected return. And even within a project, the expected return will vary depending on the city in which the investment would be made. Basic investment theory teaches that a firm invests in a project so long as the internal rate of return (IRR) on a project is greater than the minimum required rate of return, as measured by the firm's the cost of capital. To believe that public-utility-style regulation would undermine investment at the margin, one needs only to believe that reclassification would either (1) increase an ISP's cost of capital or

(2) reduce the expected return of a set of ISP investment opportunities. Projects with an IRR above the pre-reclassification cost of capital but below the post-reclassification cost of capital are called the "marginal" investments.

16. With respect to the first mechanism, an ISP's investment decisions involve participants—namely, the investor community—not entirely under the ISP's employ. External investors could demand a risk premium (over and above what they otherwise would demand) to compensate for the added risk associated with the new rules. An investor may ask: Why should I lend an ISP money for a new project if there is a heightened chance under reclassification that the ISP would be subject to rate regulation or mandatory sharing rules? Through the haggling between an ISP and its investors, the new risk could manifest itself in the form of a higher cost of capital.

17. Turning to the second mechanism, holding constant the cost of capital, reclassification could reduce the expected return of an array of investment projects by a certain percentage. This would not mean that all such projects would be abandoned. But if Project A's IRR was reduced from 10 to 9 percent, while Project B's IRR was reduced from 6.0 to 5.4 percent, and if the ISP's cost of capital were 6 percent, then Project B would be abandoned. In a seminal application of this theory, in 2002, Cambridge Strategic Management Group (CSMG) examined the potential effects of mandatory unbundling on fiber to the home (FTTH) deployments by incumbent and competitive providers.[8] CSMG projected that if unbundling of fiber loops were required, fiber deployments would pass only five percent of U.S. households in a ten-year period. In contrast, if unbundling of fiber loops was not mandated, CSMG estimated that by 2013 FTTH could be economically deployed in 31 percent of households. In 2003, the FCC relied in part on

8. CSMG, Assessing the Impact of Regulation on Deployment of Fiber to the Home, Jan. 16, 2003, http://apps.fcc.gov/ecfs/ document/view?id=6513403787

these findings to decide not to mandate unbundled access to FTTH loops, concluding, "We expect that this decision to refrain from unbundling incumbent LEC next-generation networks...will stimulate facilities-based deployment."[9]

18. The 2015 Open Internet Order ("OIO") subjects ISPs to public-utility-style regulation, potentially triggering both investment-reducing mechanisms described above. Although certain ISP rates such as interconnection will be subject to the "just and reasonable" rate-setting standard of sections 201 and 202 of the Communications Act,[10] the OIO forbears from other provisions of Title II, including sections that would require ISPs to share their networks with resellers on an unbundled basis.[11] The OIO was quick to point out that the record supports an inference that even the more invasive unbundling provisions did not discourage ISP investment, and may have (counter-intuitively) enhanced ISP investment before DSL was reclassified as an information service in 2005.[12] The OIO cites a Free Press filing, which purports to show that "the average annual investment by telecom carriers was 55 percent higher under the period of Title II's application than it has been in the years since the FCC removed broadband from Title II."[13]

19. Investment during the prior application of Title II can serve as a proxy for how ISPs will react to Title II. Following the 1996 Telecom Act, the FCC in 1999 required incumbent local exchange carriers (LECs) to share a portion of their lines with resellers of DSL service at regulated rates ("line sharing"). Although DSL was not reclassified as an information service until August

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9. Review of the Section 251 Unbundling Obligations of Incumbent Local Exchange Carriers, Report and Order and Order on Remand, and Further Notice of Proposed Rulemaking, Aug. 21, 2003, https://apps.fcc.gov/edocs_public/attachmatch/FCC- 03-36A1.pdf.

10. 2015 Open Internet Order, ¶513 ("The Commission retains authority under sections 201, 202 and the open Internet rules to address interconnection issues should they arise, including through evaluating whether broadband providers' conduct is just and reasonable on a case-by-case basis."

11. *Id*. ¶37.

12. The 2015 OIO does not offer an economic theory for how unbundling requirements could induce a provider to increase its investment.

13. *Id*. ¶414 n. 1210.

2005,[14] the courts largely disemboweled the common-carrier regime well before 2005. The D.C. Circuit Court of Appeals vacated the FCC's Line Sharing Order in May 2002, and the FCC eliminated line sharing as an unbundled network element in August 2003. Other portions of the FCC's unbundling rules were vacated even earlier.

20. How would an economist go about measuring the incremental effect of the "treatment" variable (Title II)? At the very least, one would have to identify a control group—this avoids the 2015 OIO's mistake of reflexively attributing any change in investment to a change in regulation, to the exclusion of myriad additional factors that influence investment decisions. The natural control group for this period consists of cable operators, which served as the incumbent telcos' chief broadband rivals. Unlike DSL service, cable modem service was classified as an information service from the get-go, and was never subject to the FCC's onerous unbundling regime.

21. Economists are fond of difference-in-differences ("DID") analysis because it allows one to control for certain sources of bias. Here, by including cable as a control in a DID model, any bias caused by variables common to telcos and cable are controlled for, even when these variables are unobserved. Under certain technical assumptions, the DID can identify the incremental effect of the treatment. So what does DID tell us about the effect of Title II on telco investment? According to a report by CITI,[15] cable capital expenditures ("capex") had reached $15.9 billion by 2008 (the earliest date in the CITI sample), and the "major telco wireline" capex

14. *FCC Classified DSL as Information Service*, TECH LAW JOURNAL, Aug. 5, 2005, http://www.techlawjournal.com/topstories/2005/20050805a.asp.

15. Robert Atkinson & Ivy Schultz, Broadband in America: Where Is It and Where Is It Going? Preliminary Report Prepared for the Staff of the FCC's Omnibus Broadband Initiative, Nov. 2009, http://www8.gsb.columbia.edu/rt les/citi/91a20123-2501- 0000-0080-984f56e8d343.pdf.

(excluding wireless) reached $26.3 billion (Table 14). According to a TIA study,[16] in 1996, cable capex was $6.7 billion, and LEC capex was $18.1 billion. Thus, over the intervening period where incumbent telcos were uniquely subject to Title II (with the aforementioned caveats), 1996 through 2008, cable capex increased by $9.2 billion for a compound annual growth rate ("CAGR") of 7.5 The simple DID model tells us that Title II was responsible for slowing telco investment by roughly $1 billion per year (equal to the $10.4 billion difference between the two groups in 2008 less the $11.4 billion difference in 1996).[17] A $1 billion decline represents a 5.5 percent decline relative to the telcos' 1996 capex. And the growth rate of cable capex was double that of Title II-regulated telcos over this period (7.5 percent versus 3.2 percent). This is hardly consistent with the 2015 OIO's claim that Title II was good for telco investment.

22. So how can the FCC and Free Press claim that telco investment was "55 percent higher under the period of Title II's application" than in the later period? The answer turns on the relevant window around the 2005 reclassification of DSL service. In particular, if one includes the years 1999 and 2000 as part of the pre-2005 period, then removal of Title II appears to have caused a massive decline in Bell investment. But those early years are associated with the dot.com boom and long-haul fiber glut, and it is difficult to remove Bell investments in backbone infrastructure from the capex figures. Moreover, investments during the "bubble" era were driven by what proved to be irrational expectations of growth and keeping up with unregulated competitors (cable,

16. TIA, Investment, Capital Spending And Service Quality In U.S. Telecommunications Networks: A Symbiotic Relationship, Nov. 2002, *available at* http://www.tiaonline.org/policy_/publications/filings/documents/Nov13-2002_CapEx_QoS_Final.pdf.

17. Using USTelecom's data for cable and telco capex paints a more dramatic picture. The difference in the differences between 2008 and 1996 is $10.6 billion, a decline of 38.7 percent. The difference in the differences between 2005 and 1996 is $10.2 billion, a decline of 37.2 percent. Data are available upon request from author.

CLECs), which were building to meet that expected demand, while at the same time building infrastructure that could cannibalize the telcos' core voice business (VoIP).

23. If instead one uses a shorter window around the reclassification event in 2005, which reduces the likelihood of other investment-related factors changing over time (thereby conflating the before-after comparison), then the removal of Title II appears to be associated with an increase in Bell investment. For example, a comparison of the 2002-05 average ($19.5 billion) to the 2006-09 average ($22.0 billion) implies that the application of Title II slowed Bell investment by roughly $2.5 billion per year before controlling for other factors. A $2.5 billion decline represents a 12.8 percent decline relative to Bell capex in 2002-05. Alternatively, a comparison of the 2001-05 average ($22.8 billion) to the 2006-10 average ($21.3 billion) implies that Title II had no material effect on Bell investment.

## CONCLUSION

24. For the forgoing reasons, I conclude that relative to 2014, broadband investment in the United States has declined. Although that finding does not by itself imply causation, a natural experiment from the late 1990s/early aughts lends support to the inference that Title II was the cause of the investment slowdown.